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RESEARCH ARTICLE

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New species of the plesiomorphic genus *Nixonia* Masner (Hymenoptera, Platygastroidea, Platygastridae, Scelioninae) from South Africa

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Abstract

Two new species of *Nixonia* Masner (Hymenoptera, Platygastridae, Scelioninae), *Nixonia masneri* **sp. n.** and *Nixonia mcgregori* **sp. n.** are described from South Africa and further records of *Nixonia corrugata* Johnson & Masner, *Nixonia lamorali* Johnson & Masner, *Nixonia stygica* Johnson & Masner are documented. Johnson and Masner's 2006 identification key is modified to include the newly described species. Online interactive Lucid matrix and Lucid Phoenix dichotomous keys are available on WaspWeb at http://www.waspweb.org/Platygastroidea/Keys/index.htm. Lucid data files in lif and sdd format are available at: doi:10.3897/zookeys.20.112.app.1.ik and doi:10.3897/zookeys.20.112.app.2.ik.

Keywords

Holotype, Hymenoptera, identification key, new species, lucid keys, Nixonia, Platygastridae, South Africa, Scelioninae, taxonomy

Introduction

The genus *Nixonia* was for a long time only known from two species, *Nixonia pretiosa* Masner (Namibia) and *Nixonia atra* Masner (Angola, Democratic Republic of Congo,

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Kenya, Malawi, Rwanda, Zimbabwe) (Masner 1958, 1970). More recently twelve additional species were described (Johnson and Masner 2006): *Nixonia bini* (Somalia); *Nixonia corrugata* (South Africa); *Nixonia elongata* (South Africa); *Nixonia flavocincta* (Namibia); *Nixonia gigas* (South Africa); *Nixonia krombeini* (India, Laos, Sri Lanka, Thailand, Vietnam); *Nixonia lamorali* (South Africa); *Nixonia pecki* (Botswana, South Africa, Zimbabwe); *Nixonia priesneri* (Egypt); *Nixonia sicaria* (Namibia); *Nixonia stygica* (South Africa); *Nixonia watshami* (Botswana, Namibia, Zimbabwe). The only host record for the genus is for *N. watshami*, which been reared from the eggs of *Acanthoplus discoidalis* (Walker) (Orthoptera: Tettigoniidae, Hetrodinae) in Botswana and Namibia (Johnson and Masner 2006).

Prior to the recent implementation of an intensive inventory survey program near Nieuwoudtville under the auspices of the PBI Platygastroidea project, a total of 121 *Nixonia* specimens representing 14 species were known, 77 of these specimens belonging to two widely distributed species and seven species only known from singletons (Johnson and Masner 2006). During the first two months of sampling in the Hantam National Botanical Gardens near Nieuwoudtville, 39 specimens (10 females, 29 males) of a new species related to *N. gigas* and 5 specimens (2 females and 3 males) of *N. corrugata* were collected, illustrating the historical lack of intensive sampling in the right places at the right time (van Noort 2008).

A further undescribed *Nixonia* species related to *N. lamorali* emerged from processing of samples collected in Kogelberg Biosphere Reserve (50km east of Cape Town). This species may usurp *N. gigas* as the largest *Nixonia*, and is appropriately named in honour of Lubomír Masner, the doyen of platygastroid taxonomy. Here we describe these two new species, modify the existing key (Johnson and Masner 2006) and provide links to online versions of the key.

Materials and methods

Classification follows Sharkey (2007) who synonymised the family Scelionidae with Platygastridae based on the phylogenetic analysis of Murphy et al. (2007). Platygastroidea currently comprises the single family Platygastridae containing five subfamilies: Platygastrinae; Sceliotrachelinae, Scelioninae, Teleasinae and Telenominae.

Images were produced using the EntoVision micro-imaging system. This system included a Leica M16 zoom lens attached to a JVC KY-75U 3-CCD digital video camera that fed image data to a notebook computer. The program Cartograph 5.6.0 was then used to merge an image series into a single in focus image. Lighting was achieved using techniques summarized in Buffington et al. (2005), Kerr et al. (2009) and Buffington and Gates (2009). The individual images are archived at the image database at The Ohio State University (purl.oclc.org/NET/hymenoptera/specimage) with MorphBank (www.morphbank.net) and waspweb (http://www.waspweb.org/Platygastroidea/Platygastridae/Scelioninae/Nixonia/index.htm). All new species have been prospectively registered with Zoobank (Polaszek et al. 2005). Life sciences identifiers, lsids, may be resolved at the specified URLs.

Online interactive keys were produced using Lucid and Lucid Phoenix. These keys are available at: http://www.waspweb.org/Ichneumonoidea/Keys/index.htm. Users can choose between three different key formats depending on their personal preference. The key to Nixonia is available in three formats. Although Lucid Phoenix keys are interactive keys they are still dichotomous and a choice needs to be made at each key couplet to continue. Lucid matrix keys, on the other hand, use a different approach where relevant states from multiple character features can be selected independently until identification is achieved. For more information concerning Lucid keys visit http://www.lucidcentral.org. Files are provided as appendices in two formats enabling conversion of the Lucid matrix key to other platforms. 1. Lucid Interchange Format version 3 (LIF3) files are XML-based files that store all the Lucid3 key data, allowing exchange of the key with other key developers. 2. SDD files are XML-based files structured using the internationally agreed SDD (Structure of Descriptive Data) Schema. SDD files may be used to exchange Lucid keys with other SDD-compliant applications.

Abbreviations and terms used in text: A1, A2, … A14: antennomere 1, 2, … 14; claval formula: distribution of the large, multiporous basiconic sensilla on the underside of apical antennomeres of the female, with the segment interval specified followed by the number of sensilla per segment (Bin 1981); IOS: interocular space, shortest distance between the inner margins of the compound eyes; LOL: lateral ocellar line, shortest distance between inner margins of median and lateral ocelli (Masner and Huggert 1989); OOL: ocular ocellar line, shortest distance from inner orbit and outer margin of posterior ocellus (Masner and Huggert 1989); POL: posterior ocellar line, shortest distance between inner margins of posterior ocelli (Masner and Huggert 1989); epomial carina: the vertical portion of epomium on the pronotum; pronotal humeral carina: the horizontal portion of epomium on the pronotum; S1, S2, … S6: metasomatic sterna 1, 2, … 6; T1, T2, … T7: metasomatic tergum 1, 2, … 7; submarginal ridge on T1: carina dorsal and roughly parallel to the lateral margin of T1; sublateral tergal carina: longitudinal carina at the junction of dorsal and lateral faces of a metasomal tergite. Morphological terminology otherwise follows Mikó et al. (2007).

Classification of vegetation (habitat association) follows Mucina and Ruthaford (2006).

Depositories:

OSUC C.A. Triplehorn Insect Collection, Columbus, OH
http://biocol.org:urn:lsid:biocol.org:col:1014

SAMC Iziko Museums of Cape Town, South Africa
http://biocol.org:urn:lsid:biocol.org:col:1018

Accession numbers prefixed with OSUC are unique identifiers for the individual specimens, whereas numbers prefixed with SAM-HYM-P are unique identifiers for a series of specimens with the same collecting data.

Nixonia Masner

urn:lsid:zoobank.org:act:E56C690B-55E3-4977-B7CF-6493DEF73E6C

Nixonia Masner, 1958: 101. Original description. Type: *Nixonia pretiosa* Masner, by monotypy and original designation. For subsequent taxonomic literature see Johnson (1992) or The Genera of Platygastroidea of the World (http://purl.oclc.org/NET/hymenoptera/platygastroidea).

Diagnosis. *Nixonia* is superficially similar to *Scelio* Latreille, and to the larger, more elongate species of *Macroteleia* Westwood and *Triteleia* Kieffer. *Nixonia* is distinguished by the 14 segmented, nonclavate antennae; the strong medial propodeal tooth; and the presence of two tibial spurs on both the mid-and hind tibiae.

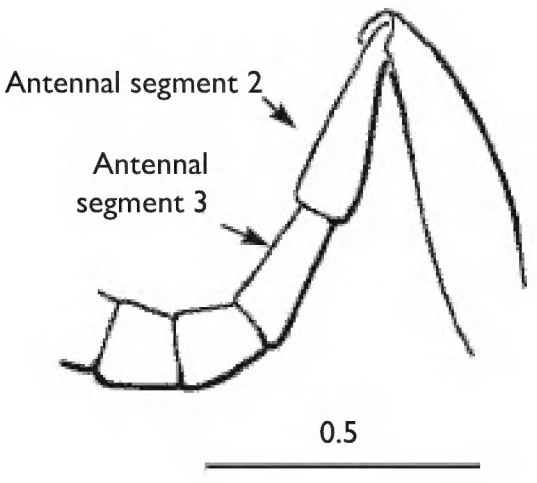
Distribution. *Nixonia* species richness is centered in southern Africa, but distribution extends north to Egypt, Kenya, Somalia, Rwanda, and the Democratic Republic of Congo (former Zaire). A single species, *N. krombeini*, is found in Sri Lanka, northern India, and southeast Asia (Thailand, Laos, and Vietnam). See http://hol.osu.edu/map-large.html?id=523 for distribution map.

Biology. Only one species has been reared: *Nixonia watshami* a parasitoid of the eggs of *A. discoidalis* (Walker, 1869) (Orthoptera: Tettigoniidae, Hetrodinae). The subfamily Hetrodinae is endemic to Africa and adjacent areas of the Arabian Peninsula (Otte et al. 2009) and all 14 genera are likely to play hosts for *Nixonia* species. The host, however, of at least *N. krombeini* which occurs outside the range of Heterodinae in tropical Asia must be some other large orthopteran (Johnson and Masner 2006).

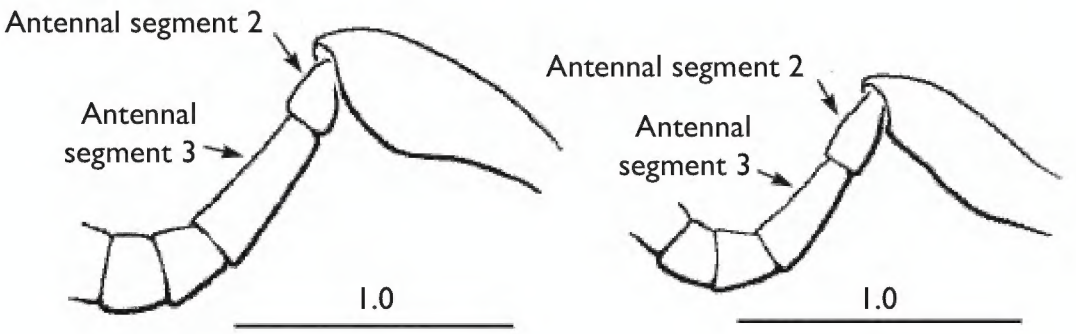
Key to species of *Nixonia*

Online interactive Lucid matrix and Lucid Phoenix keys are available at: http://www.waspweb.org/Platygastroidea/Keys

1 Third antennal segment shorter than, or subequal to, second antennal segment **2**



– Third antennal segment longer (>1.15×) than second antennal segment.....**5**



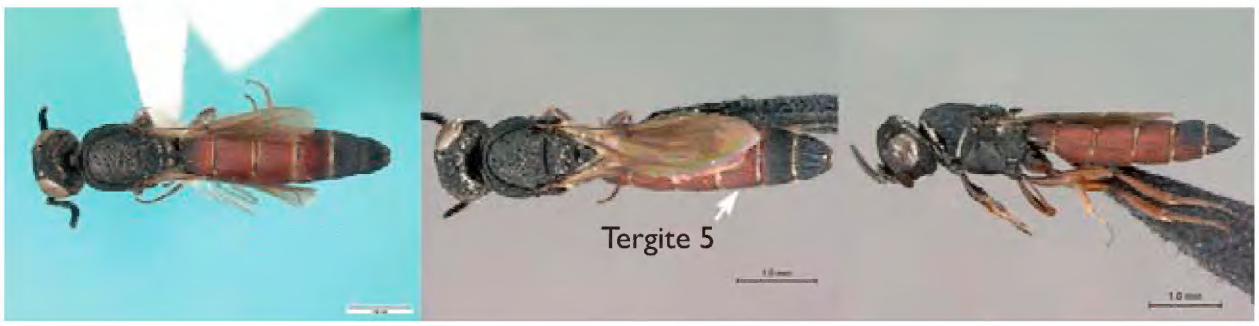
2 Femora and tibiae yellow; eye height at least 2.5× shortest distance between eyes..... **3**

– Femora and tibiae reddish brown to black; eye height less than twice shortest distance between eyes.....**4**

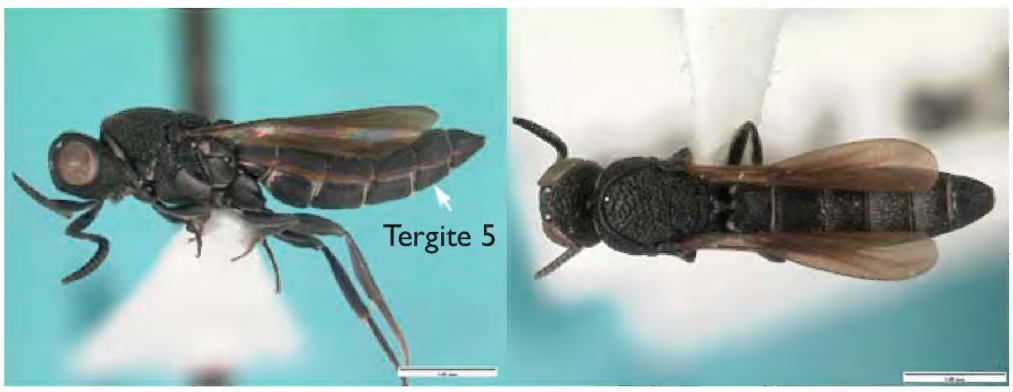
3 Medial portion of posterior margin of pronotum, scutellar rim, tegulae, propodeal tooth, margins of tergites 1–4, and tarsi yellow; upper mesepisternum punctuate; Namibia ..... ***N. flavocincta***

– Mesosoma, metasoma black without yellow markings, tarsi dark brown; upper mesepisternum longitudinally striate; Namibia ..... ***N. sicaria***

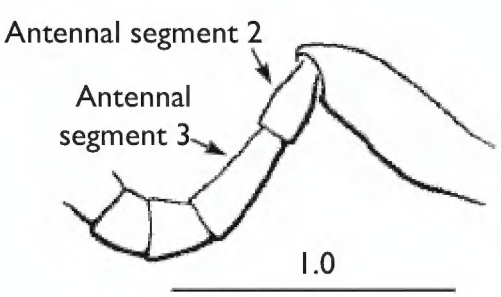
4 Forewings extending to middle or posterior margin of tergite 4; female metasoma with tergites 2–4 brick red, mid- and hind femora and tibiae reddish brown; South Africa..... ***N. corrugata***



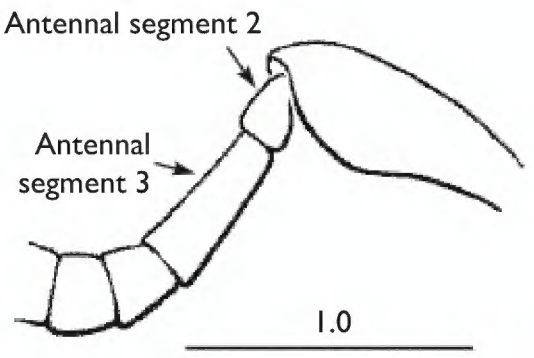
– Forewings longer, extending nearly to posterior margin of tergite 5; female body and legs entirely black; South Africa..... ***N. stygica***



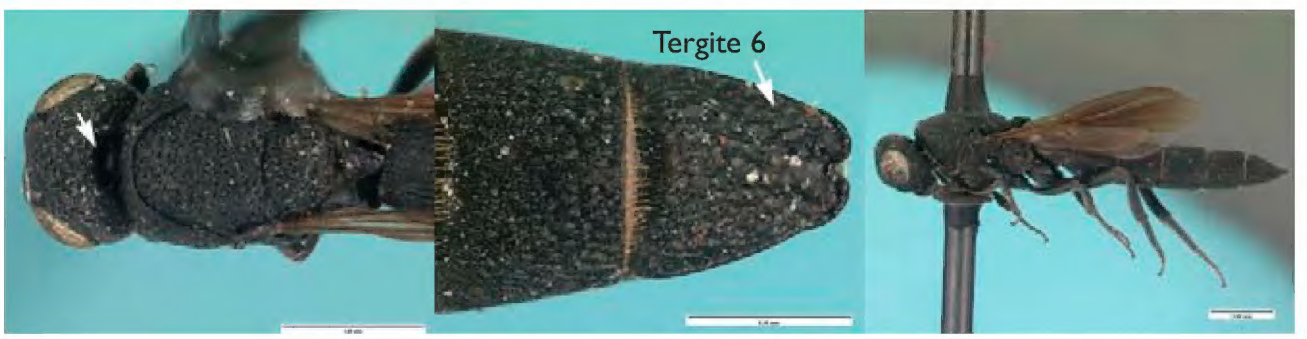
5 Third antennal segment only slightly longer (1.15×) than second antennal segment **6**



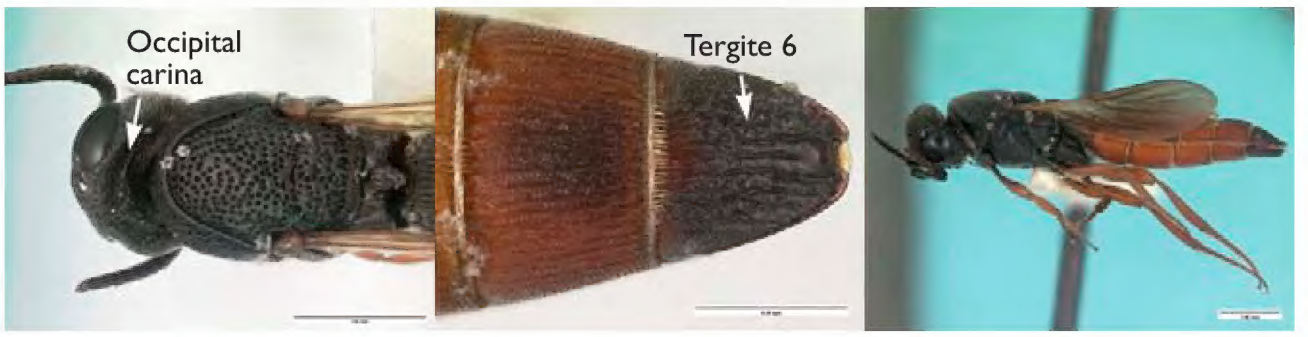
– Third antennal segment significantly longer (1.4–3.1×) than second antennal segment 7



6 Occipital carina not developed; female tergite 6 irregularly carinate; female body and legs entirely black; South Africa..... ***N. elongata***

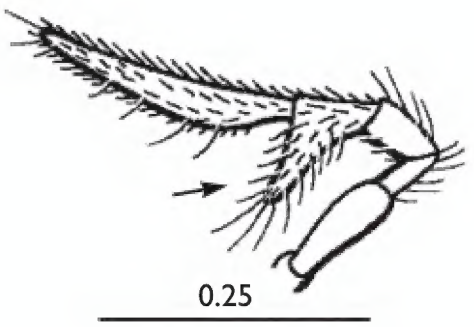


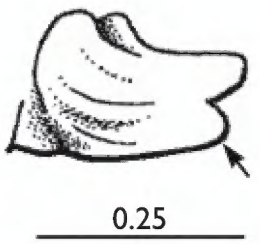
– Occipital carina massive; female tergite 6 longitudinally carinate; female metasomatic segments 2–5 brick red; legs, except coxae, reddish orange; South Africa, Botswana.....***N. pecki***



7 Maxillary palpomere 4 cylindrical; mandible long, with lower tooth either absent or much shorter than upper, base of mandible with dense tuft of thick setae **8**

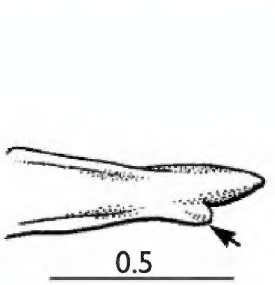
– Maxillary palpomere 4 with strongly expanded lateral lobe, width of palpomere nearly equal to its length; mandible short, bidentate, lower tooth only slightly shorter than upper, base of mandible without dense tuft of thick setae.....**10**



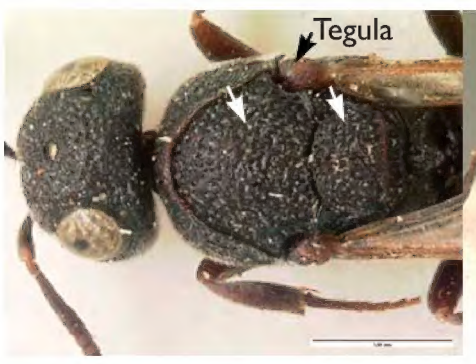


8 Mandible unidentate, with no indication of lower tooth; legs orange-yellow; Somalia..... ***N. bini***

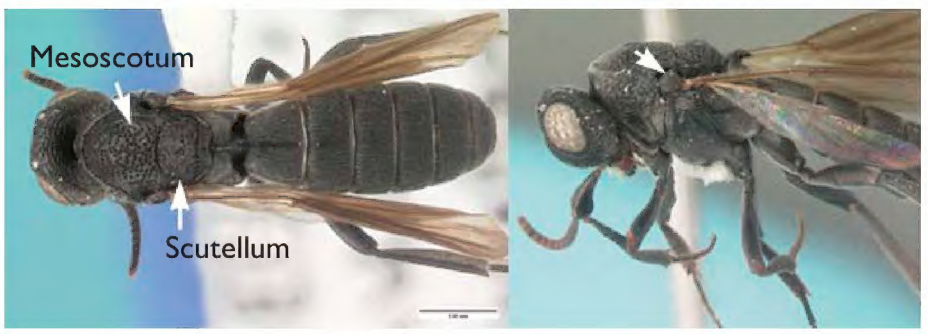
– Mandible with short, but distinct lower tooth; legs black.....**9**



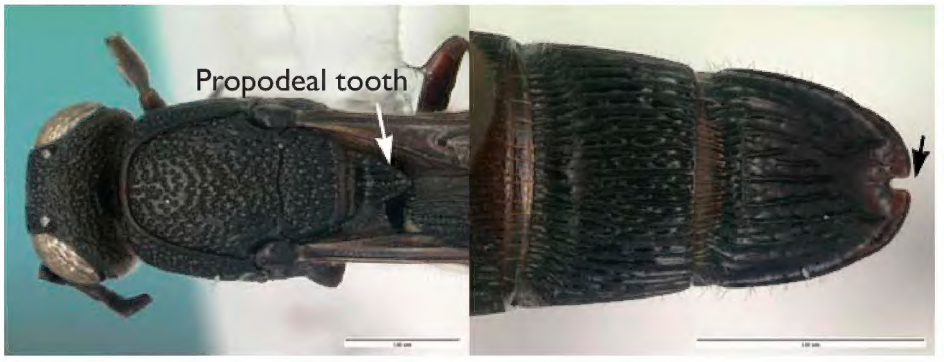
9 Mesoscutum and scutellum with irregular, sharply defined rugulosities, with small setigerous punctures scattered over surface; tegula reddish brown, distinctly lighter in color than mesoscutum; Egypt.....***N. priesneri***



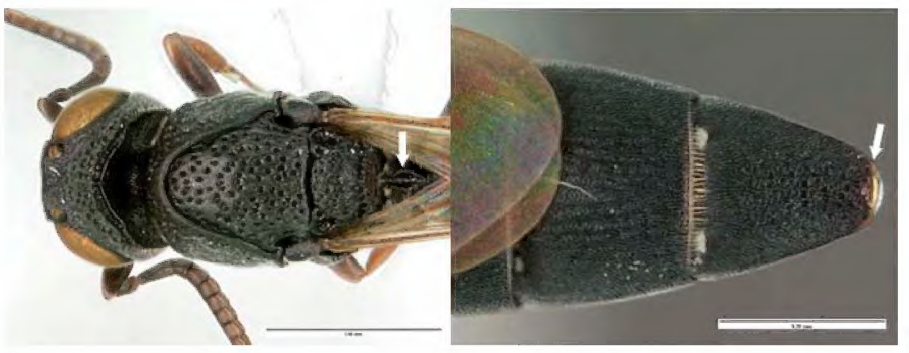
– Mesoscutum and scutellum covered by deep, confluent, large setigerous punctures; tegula black, concolorous with mesoscutum; Angola, Congo, Kenya, Malawi, Rwanda, Zimbabwe..... ***N. atra***



10 Propodeal tooth cordate to subcordate, sides convex, longitudinally carinate, with or without medial depression; scutellum longitudinally striate; female tergite 6 deeply, emarginate posteromedially; large, 9 mm in length; South Africa **11**

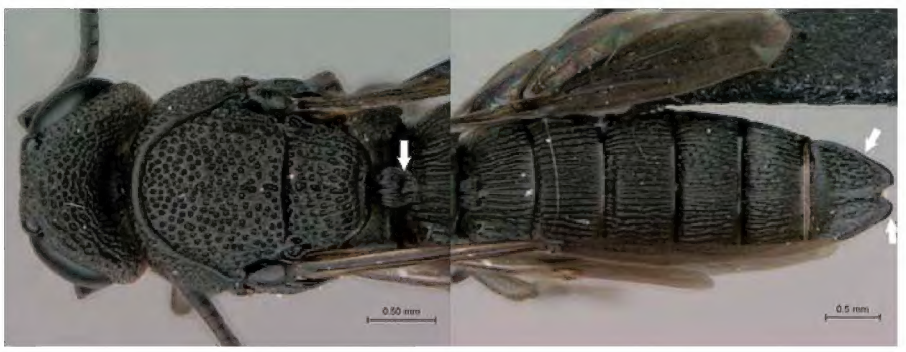


– Propodeal tooth with sides straight, and pointed or ligulate, usually with deep medial depression; scutellum areolate-punctate; female tergite 6 with only shallow emargination posteromedially; moderate in size, 5–7 mm in length..... **12**

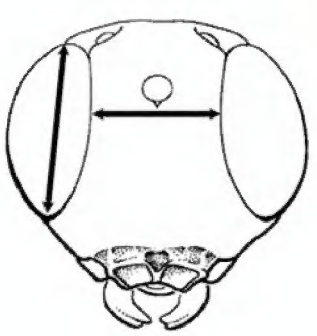


11 Fore- and midtibiae with numerous stout, semi-erect, dark spines over outer surface; propodeal tooth without depression; female tergite 6 deeply, narrowly emarginate posteromedially, lateral flanges narrow..... ***N. gigas***

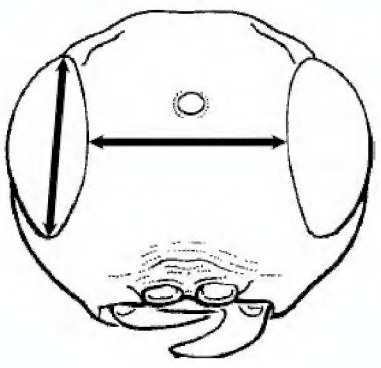
– Fore and midtibiae at most with small, semi-appressed spines; propodeal tooth with posterior-medial depression; female tergite 6 with deep, broad emargination posterio-medially, lateral flanges wide and conspicuous..... ***N. mcgregori***



12 Eye height distinctly greater than shortest distance between eyes; mesoscutum with scattered punctures and wide interstices with dense mat microsculpture; India, Laos, Sri Lanka, Thailand, Vietnam ..... ***N. krombeini***

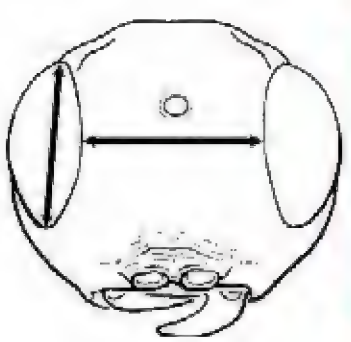


– Eye height sub-equal to, or only slightly greater, than shortest distance between eyes; mesoscutum with dense large punctures and narrow interstices with shining surface; Africa..... **13**

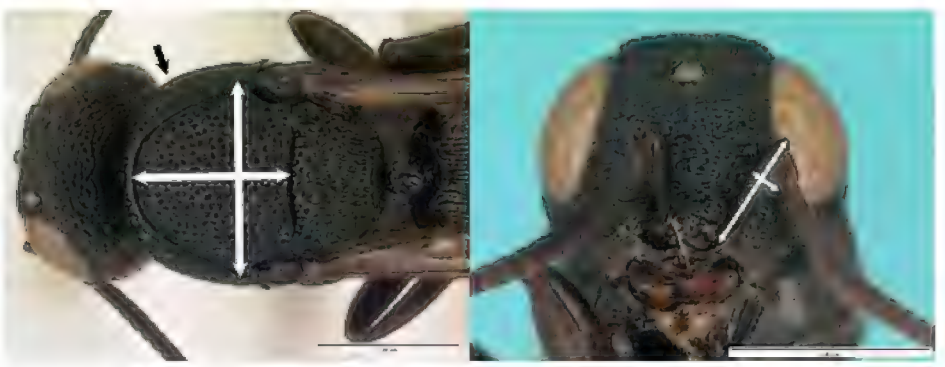


13 Shortest distance between eyes 0.9× eye height; forewing with several streaks of heavy infuscation; body length 7–10 mm; South Africa..... **14**

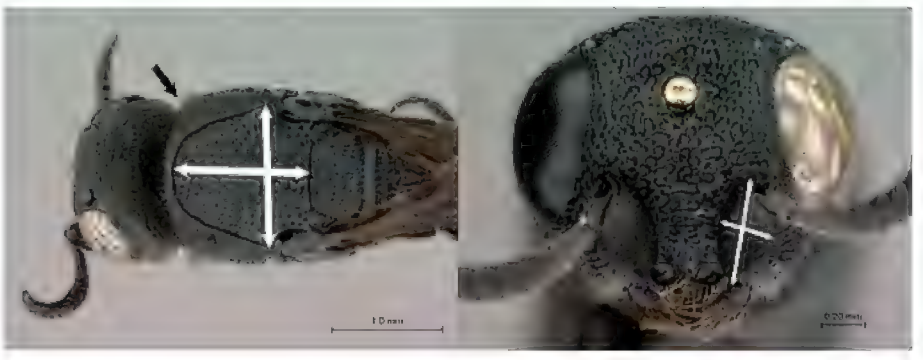
– Shortest distance between eyes equal to eye height; forewing with only moderate streaks of infuscation; body length 5.0–5.5 mm **15**



14 Mesoscutum wider than long; scape elongate (3× longer than wide); dense field of setae obvious on vertex in anterior view; pronotal shoulders rounded..... ***N. lamorali***



– Mesoscutum as wide as long; scape expanded (2.5× longer than wide); setae sparse on vertex; pronotal shoulders subquadrate ..... ***N. masneri***



15 Mesosoma, antennae, and legs entirely dark brown to black; Botswana, Namibia, Zimbabwe..... ***N. watshami***

– Pronotum, mesonotum, antennomeres 1–3, and legs beyond coxae deep orange to reddish brown; Namibia ..... ***N. pretiosa***

Nixonia masneri **van Noort & Johnson, sp. n.**
urn:lsid:zoobank.org:act:51495B19-AA60-4560-AAC6-2EED4110C0ED
Figures 1A–F

Type material. Holotype male. SOUTH AFRICA, Western Cape, Kogelberg Nature Reserve, 34°16.481'S 19°01.033'E, 16 Jan–16 Feb 2000, S. van Noort, Malaise trap, KO98-M53, Mesic Mountain Fynbos, last burnt c. 1978, SAM-HYM-P025052, OSUC 256956 (SAMC). Paratypes: 2 males, same data SAM-HYM-P025052, OSUC 256940 (SAMC, OSUC); 1 male: South Africa, Northern Cape, Avontuur Farm, 16km NW Nieuwoudtville, 764m, 31°16.249'S 19°02.900'E, 25 Dec 2008–27 Jan 2009, S van Noort, Malaise trap, GL07-FYN1-M73, Bokkeveld Sandstone Fynbos, SAM-HYM-P030242, OSUC 268382 (SAMC).

Diagnosis. Most similar to *Nixonia lamorali*, distinguished by the mesoscutum which is as wide as long; a more expanded scape (2.5× longer than wide); lack of setae on the vertex; occipital carina present dorsally; and pronotal shoulders that are subquadrate.

Etymology. Named in honour of Lubomír Masner, who with his enthusiasm and dedication to the discovery and description of parasitic wasp species, has inspired passion in numerous protégés to catalogue the incredible hyper-diversity of the micro world.

Distribution and habitat association. Currently only known from two widely spaced localities: Kogelberg Nature Reserve in the Western Cape Province and Avontuur Farm in the Northern Cape Province (Fig 3). The species is associated with the Fynbos biome and is thus likely to be present over a much larger area than currently recorded (the extent of the Fynbos biome is depicted in Fig 3). Distribution map available at http://hol.osu.edu/index.html?id=247388.

Description: Holotype male. Length: 8.5 mm; completely black, mandibles usually black, but may be reddish-brown (figs 1A, B); wings infuscate throughout, brownish.

Head (figs. 1C-E) transverse in dorsal view, width 1.5× length; vertex rugulose-punctate, shining; OOL short, lateral ocellus separated from inner orbit by a third of ocellar diameter; POL 1.6× LOL; occiput rugulose-punctate, with reticulate microsculpture; occipital carina weakly developed dorsally; frons rugulose-punctate, shining, above toruli with few transverse wrinkles medially; frons somewhat narrow, IOS 0.9× greatest length of eye; toruli closely approximated, separated by distance less

than half torulus diameter, frons between toruli not projecting, flat; rim of torulus evenly raised; apical margin of clypeus with blunt medial projection; position of malar sulcus demarcated by fine granulate microsculpture; sculpture of cheeks laterad of malar area rugose-punctate, with distinct longitudinal sculpture; mandible short, bidentate, upper tooth only slightly longer than lower, without dense basal tuft of setae; maxillary palpal segment 4 distinctly expanded medially, subtriangular; A1 finely reticulate, 2.5× longer than wide, greatest width beyond apical 0.6 of segment; length of A3 1.5× length of A2.

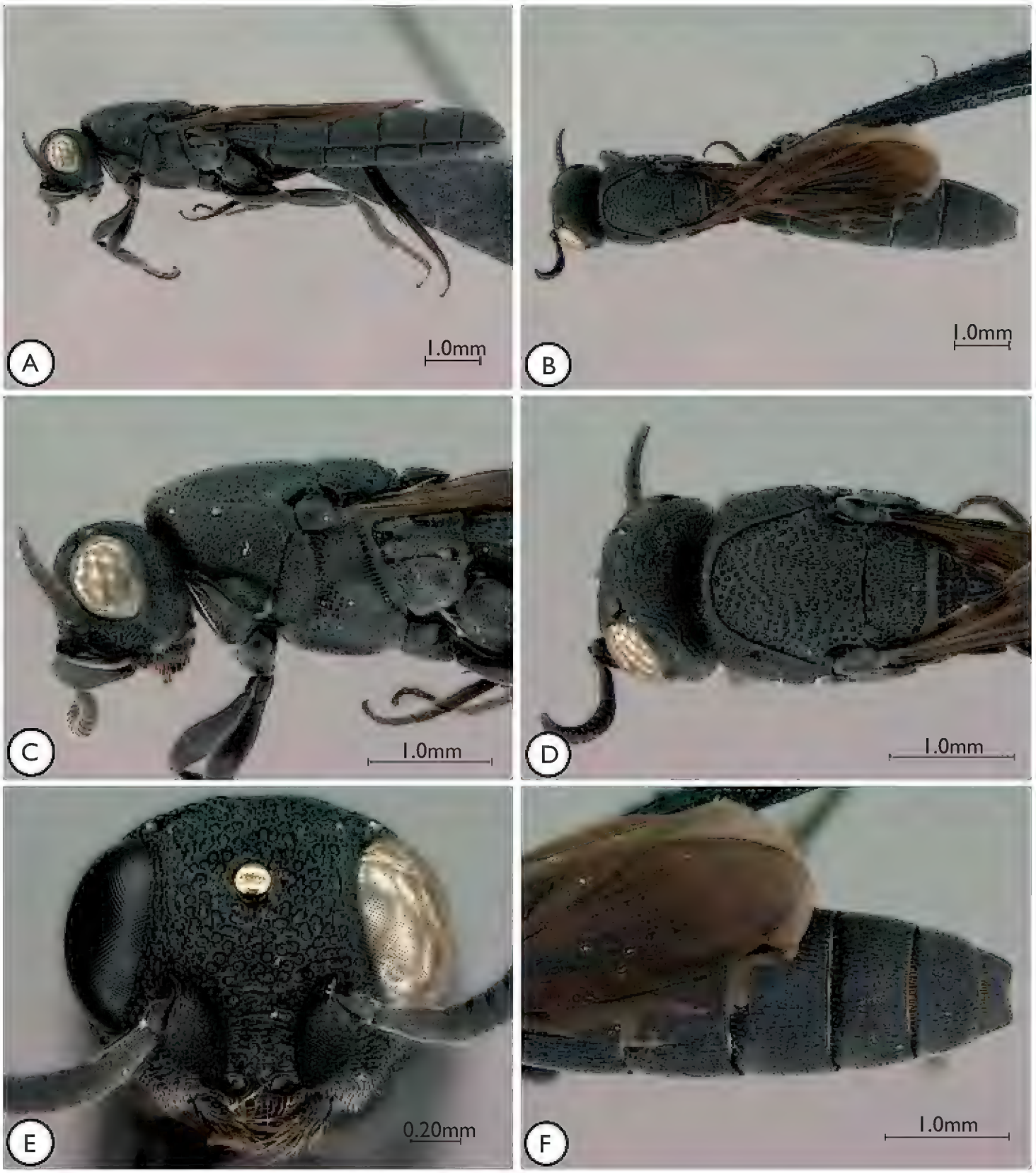


Figure 1. *Nixonia masneri* van Noort & Johnson, sp. n., male, holotype. **A** habitus, lateral view **B** habitus, dorsal view **C** head, mesosoma, lateral view **D** mesosoma, dorsal view **E** head, anterior view **F** metasoma dorsal view. Scale bars in millimeters. (http://www.morphbank.net/?id=999008676)

Mesosoma (figs. 1 C,D) as high as wide, length 1.4× height in lateral view; pronotal shoulders coarsely punctate; lateral surface of pronotum coarsely punctate; netrion punctuate-rugulose with weak longitudinal striation; mesoscutum deeply punctate, with broad interstices; parapsidal lines absent; scutellum coarsely punctate, with fine microsculpture on posterior margin; median propodeal tooth subcordate, sides straight, length 1.4× maximum width, pointed apically, with median excavation bounded by lateral longitudinal carina; upper mesepisternum with strong longitudinal sculpture; fine foveae separating mesepisternum and mesepimeron extending from base of wing to coxal cavity; lower mesepisternum finely reticulate-punctate; mesepimeral hook smooth; tegula finely punctate; apex of forewing extending to apex of T4; fore and mid tibiae with fine, semidecumbent spines on outer surface.

Metasoma (figs. 1A,B,F) 3.7× longer than greatest width; T1 1.4× wider than long; T1–T4 longitudinally rugose.

***Nixonia mcgregori* van Noort & Johnson, sp. n.**
urn:lsid:zoobank.org:act:8BC4BB9E-7CC8-4006-8399-34DD54CD40FB
Figures 2A-F

Type material. Holotype female. SOUTH AFRICA, Northern Cape, Hantam National Botanical Garden, 758m, 31°24.293'S 19°09.215'E, 10 Dec 2007 – 13 Jan

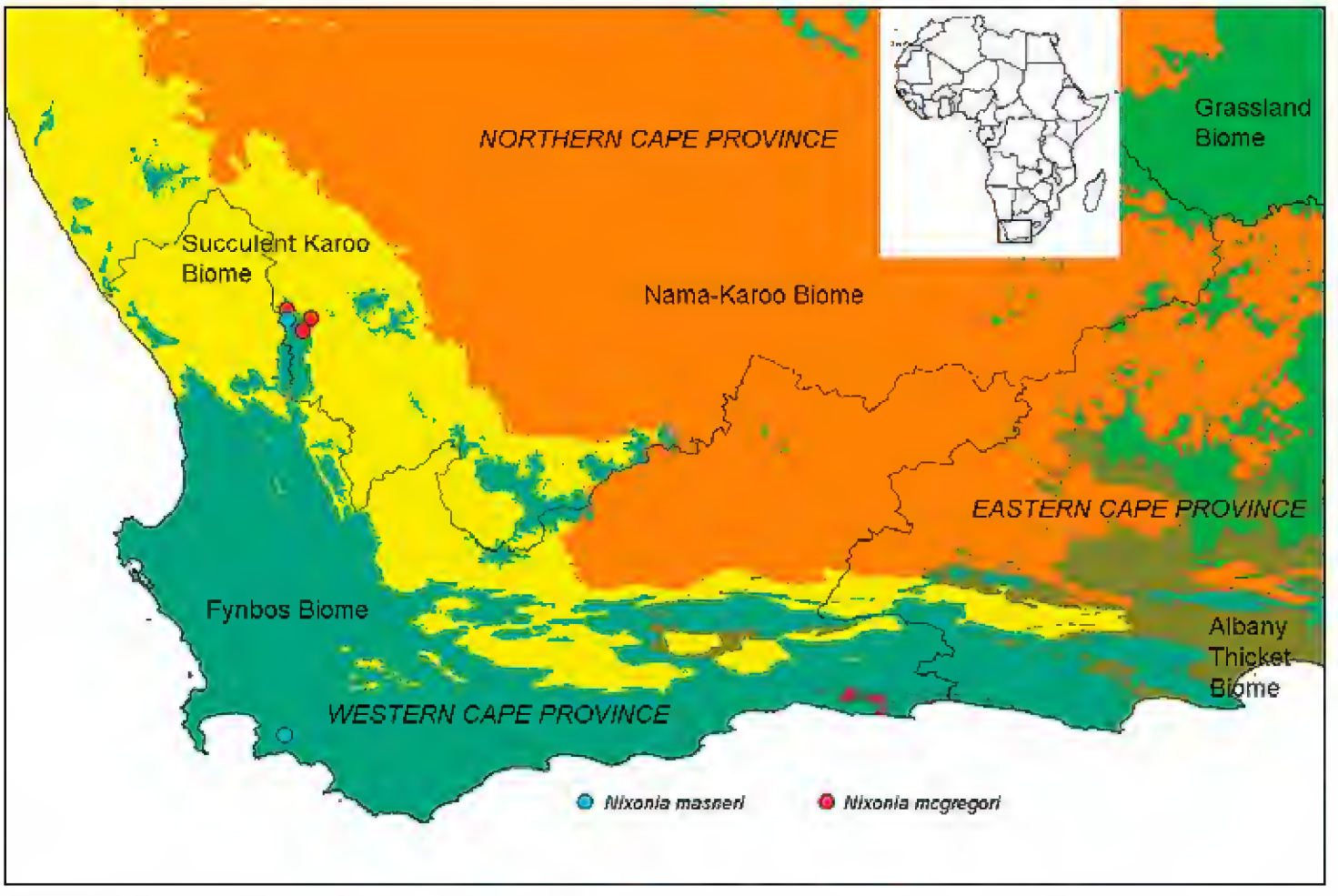


Figure 3. Distribution and habitat association of *Nixonia masneri* and *N. mcgregori*. Biome map from Rutherford et al. (2006).

2008, S van Noort, Malaise trap, GL07-DOL2-M05, Nieuwoudtville-Roggeveld Dolerite Renosterveld, SAM-HYM-P025051, OSUC 256957 (SAMC). Paratypes: 2 females, 1 male, SOUTH AFRICA, Northern Cape, Hantam National Botanical Garden, 787m, 31°24.845'S 19°09.443'E, 10 Dec 2007–13 Jan 2008, S van Noort, Malaise trap, GL07-KOP1-M06, Nieuwoudtville Dolerite Koppie Renosterveld, SAM-HYM-P025049, OSUC 256941 (SAMC, OSUC). 2 males, South Africa, Northern Cape, Hantam National Botanical Garden, 752m, 31°23.802'S

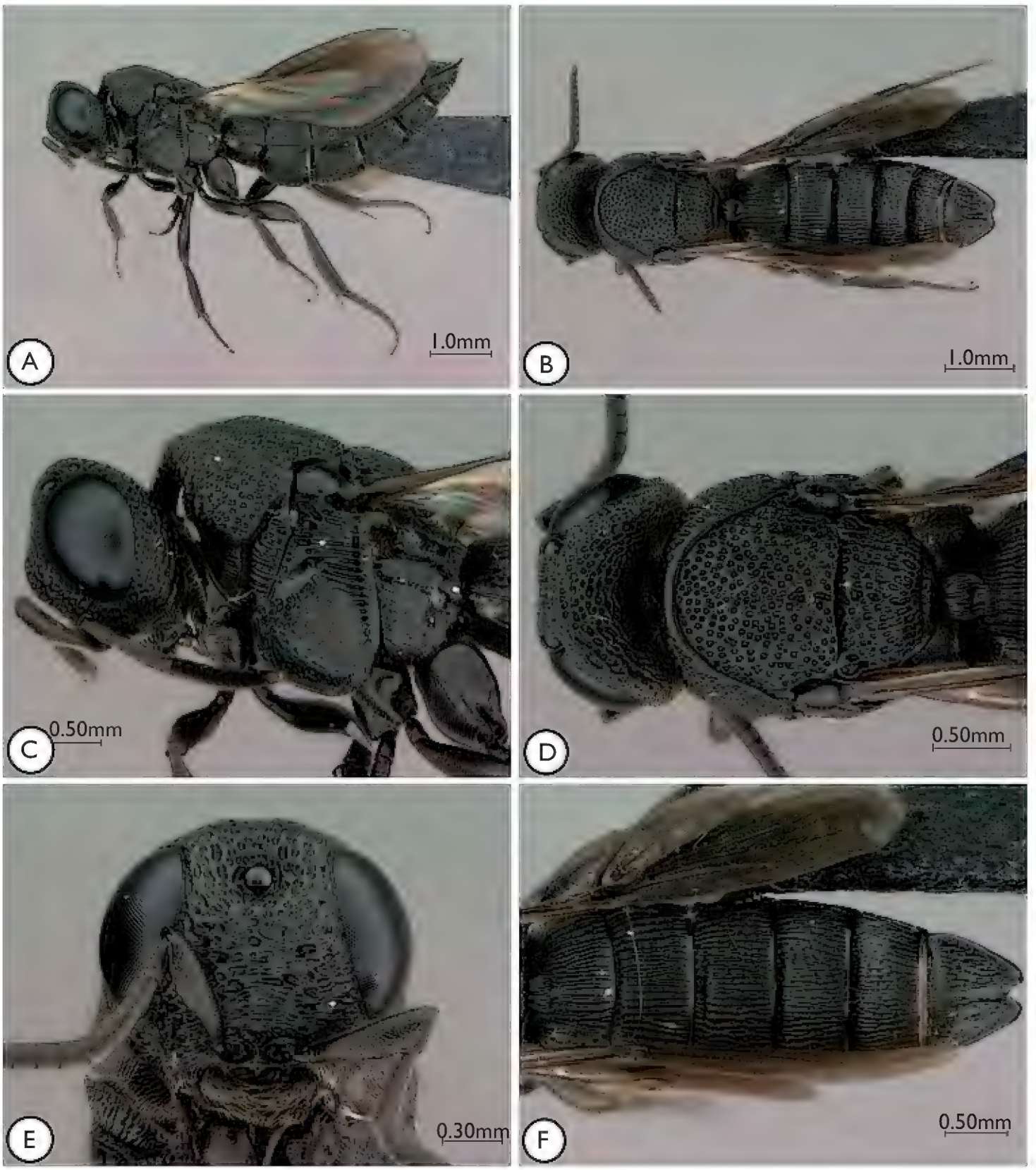


Figure 2. *Nixonia mcgregori* van Noort & Johnson, sp. n., female, holotype. **A** habitus, lateral view **B** habitus, dorsal view **C** head, mesosoma, lateral view **D** mesosoma, dorsal view **E** head, anterior view **F** metasoma dorsal view. Scale bars in millimeters. (http://www.morphbank.net/?id=999008677)

19°08.799'E, 10 Dec 2007–13 Jan 2008, S van Noort, Malaise trap, GL07-REN1-M01, Nieuwoudtville Shale Renosterveld, SAM-HYM-P025050 (SAMC). 1 female, 2 males, South Africa, Northern Cape, Hantam National Botanical Garden, 755m, 31°24.274'S 19°09.164'E, 10 Dec 2007 – 13 Jan 2008, S van Noort, Malaise trap, GL07-DOL1-M04, Nieuwoudtville-Roggeveld Dolerite Renosterveld, SAM-HYM-P025047 (SAMC). 7 males South Africa, Northern Cape, Hantam National Botanical Garden, 797m, 31°24.841'S 19°09.551'E, 10 Dec 2007 – 13 Jan 2008, S van Noort, Malaise trap, GL07-KOP2-M07, Nieuwoudtville Dolerite Koppie Renosterveld, SAM-HYM-P025048, OSUC 256942 (SAMC, OSUC). 1 male, South Africa, Northern Cape, Hantam National Botanical Garden, 741m, 31°24.182'S 19°08.587'E, 13 Jan – 14 February 2008, S van Noort, Malaise trap, GL07-REN3-M10, Nieuwoudtville Shale Renosterveld, SAM-HYM-P025054 (SAMC). 4 females, 7 males, South Africa, Northern Cape, Hantam National Botanical Garden, 787m, 31°24.845'S 19°09.443'E, 13 Jan – 14 February 2008, S van Noort, Malaise trap, GL07-KOP1-M13, Nieuwoudtville Dolerite Koppie Renosterveld, SAM-HYM-P025055, OSUC 256943, OSUC 256944 (SAMC, OSUC). 2 females, 9 males, South Africa, Northern Cape, Hantam National Botanical Garden, 797m, 31°24.841'S 19°09.551'E, 13 Jan – 14 February 2008, S van Noort, Malaise trap, GL07-KOP2-M14, Nieuwoudtville Dolerite Koppie Renosterveld, SAM-HYM-P025056, OSUC 256945, OSUC 256946 (SAMC, OSUC). 1 male, South Africa, Northern Cape, Avontuur Farm, 16km NW Nieuwoudtville, 764m, 31°16.249'S 19°02.900'E, 25 Dec 2008 – 27 Jan 2009, S van Noort, Malaise trap, GL07-FYN1-M73, Bokkeveld Sandstone Fynbos, SAM-HYM-P030249 (SAMC). 1 female, same data except: Yellow Pan trap, GL07-FYN1-Y34, SAM-HYM-P030243 (SAMC). 1 female, same data except: Yellow Pan trap, GL07-FYN1-Y35, SAM-HYM-P030244 (SAMC). 1 male, South Africa, Northern Cape, Hantam National Botanical Garden, 49m, 31°20.602'S 19°11.695'E, 25 Dec 2008 – 27 Jan 2009, S van Noort, Malaise trap, GL07-SUC1-M74, Hantam Succulent Karoo, SAM-HYM-P030245 (SAMC). 1 male, same data except for: Yellow pan trap, GL07-SUC1-Y37, SAM-HYM-P030246 (SAMC).

Diagnosis: *Nixonia mcgregori* is distinguished by the deep and broad emargination posterior-medially on T6 and the wide and conspicuous lateral flanges. It is most similar to *N. gigas*, but *N. gigas* has a very narrow excision in the female T6 and strong spines on the fore-and midtibiae.

Etymology. Named in honour of conservationist Neil McGregor, former owner of Glenlyon farm. Neil's farm has formed the core of the recently established Hantam National Botanical Garden at Nieuwoudtville.

Distribution and habitat association. *Nixonia mcgregori* is currently only known from the vicinity of Nieuwoudtville in the Northern Cape Province where it is associated with the Succulent Karoo and Fynbos biomes (Fig 3). The species has been sampled in four Fynbos vegetation types: Nieuwoudtville-Roggeveld Dolerite Renosterveld; Nieuwoudtville Dolerite Koppie Renosterveld, Nieuwoudtville Shale Renosterveld and Bokkeveld Sandstone Fynbos, as well as in the

Hantam Succulent Karoo. Distribution map available at: http://hol.osu.edu/index.html?id=247389.

Description. Holotype female. Length 7.0 mm; completely black, tarsi lighter (figs. 2A, B); wings infuscate throughout, brownish (fig. 2F).

Head (figs. 2C-E) transverse in dorsal view, width 1.8× length; vertex medially smooth, shining with very fine setiforous punctures, laterally rugulose-punctate, shining or completely rugulose-punctate, shining; OOL short, lateral ocellus in close apposition with compound eye, separated from inner orbit by a quarter of ocellar diameter; POL 1.4× LOL; occiput rugulose-punctate, shining; occipital carina not discernable; frons rugulose-punctate, shining, above toruli with strong transverse striation; frons somewhat narrow, IOS 0.87× greatest length of eye; toruli in close apposition separated by 0.14× diameter of torulus; frons between toruli not projecting, flat; rim of torulus raised dorsally and venatrally; apical margin of clypeus with medial blunt tooth; area below eye (in normal position of malar sulcus) with fine granulate microsculpture; cheeks laterad of malar area rugose-punctate, with longitudinal sculpture; mandible short, bidentate, upper tooth only slightly longer than lower, without dense basal tuft of setae; maxillary palpal segment 4 distinctly expanded medially, sub-triangular; A1 finely reticulate, greatest width in apical two-thirds of segment 3.9× longer than wide; length of A3 1.6× length of A2.

Mesosoma (figs. 2A, D) as high as wide, length 1.3× height; pronotal shoulders coarsely punctate; lateral surface of pronotum coarsely punctate; netrion punctuate-rugulose with strong longitudinal striation; mesoscutum deeply punctate; parapsidal lines absent; scutellum: coarsely rugulose-punctate, with longitudinal elements; median propodeal tooth subcordate, broad, length 1.1× maximum width, rounded apically, longitudinally striate except for smooth posterior-medial excavation; upper mesepisternum with strong longitudinal sculpture; fine foveae separating mesepisternum and mesepimeron extending from base of wing to coxal cavity; lower mesepisternum finely reticulate-punc-tate; mesepimeral hook longitudinally keeled; tegula finely punctate; R1 in forewing distinctly separated from costal margin, extending only halfway from R to margin; apex of forewing extending to mid or apex of T5; R in hindwing with tracheate section long, nearly reaching hamuli; outer surface of tibiae with fine, semidecumbent spines.

Metasoma (figs. 2A,B,F) 2.9× longer than greatest width; T1 twice as wide as long; terga longitudinally rugose; female T6 with broad, deep apical emargination, depth equivalent to width, lateral flange broad; T6 anteromedially with distinctive field of microsculpture.

Biology. Given that one species of *Nixonia*, *N. watshami*, has been recorded as an egg parasitoid of an armoured ground cricket, *A. discoidalis*, in Namibia and Botswana it is plausible that *N. mcgregori* and *N. corrugata* may be egg parasitoids of the armoured ground cricket species, *Hetrodes pupus* (Linnaeus, 1758) that is very common in the habitats where these two species of *Nixonia* occur.

Additional distribution records for described species

***Nixonia corrugata* Johnson & Masner, 2006**
Distribution map available at: http://hol.osu.edu/index.html?id=184918

1 male, South Africa, Northern Cape, Hantam National Botanical Garden, 787m, 31°24.845'S 19°09.443'E, 7–10 December 2007, S van Noort, Yellow pan trap, GL07-KOP1-Y02, Niewoudtville Dolerite Koppie Renosterveld, SAM-HYM-P025046, OSUC 256947 (SAMC). 1 female, 1 male, South Africa, Northern Cape, Hantam National Botanical Garden, 741m, 31°24.182'S 19°08.587'E, 10 Dec 2007 – 13 Jan 2008, S van Noort, Malaise trap, GL07-REN3-M03, Nieuwoudtville Shale Renosterveld, SAM-HYM-P025045, OSUC 256948, OSUC 256949 (SAMC); 1 female, 2 males, same data except for 13 Jan – 14 February 2008, GL07-REN3-M10, SAM-HYM-P025053, OSUC 256950, OSUC 256951, OSUC 256952 (SAMC); 1 male, same data except for 18 November – 25 Dec 2008, Yellow pan trap, GL07-REN3-Y18, SAM-HYM-P030247, OSUC 256953 (SAMC).

***Nixonia lamorali* Johnson & Masner, 2006**
Distribution map available at: http://hol.osu.edu/index.html?id=184923

1 male, South Africa, Western Cape, Langberg Farm, (3 km 270° W Langebaanweg), 32°58.461'S 18°07.344'E, 12–19 Mar 2003, S. van Noort, Malaise trap, LW02-N2-M175, Sand Plain Fynbos, SAM-HYM-P030184, OSUC 256954 (SAMC).

***Nixonia stygica* Johnson & Masner, 2006**
Distribution map available at: http://hol.osu.edu/index.html?id=184926

1 female, South Africa, Western Cape, Gamkaberg Nature Reserve, 33°39.941'S 21°53.505'E, 760m, 23.XII.2008–16.I.2009, S. van Noort, Malaise trap, GB09-SUC1-M01, Succulent Karoo/ Riverine vegetation ecotone, SAM-HYM-P030248, OSUC 256955 (SAMC).

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on Avontuur Farm. Northern Cape Nature Conservation and Cape Nature (Western Cape Province) granted collecting permits. This material is based upon work supported by the National Science Foundation under grant No. DEB–0614764 to N.F. Johnson and A.D. Austin, and by a South African National Research Foundation grant GUN 61497 to S. van Noort, and an Italian/South African Scientific and Technological Cooperation grant GUN 2068865 to S. van Noort and M. Olmi (University of Tuscia).

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Appendix 1.

Lucid Interchange Format version 3 (LIF3) file to the species of Nixonia (Hymenoptera, Platygastridae). This is an XML-based file that stores all the Lucid3 key data, allowing exchange of the key with other key developers. doi:10.3897/zookeys.20.112.app.1.ik.

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Appendix 2.

Lucid SDD file to the species of Nixonia (Hymenoptera, Platygastridae). This is a XML-based file structured using the internationally agreed SDD (Structure of Descriptive Data) Schema. This SDD file may be used to exchange the Lucid key with other SDD-compliant applications. doi:10.3897/zookeys.20.112.app.2.ik.

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